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Evaluation of a Polyvinyl Toluene Neutron Counter Array

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Purpose: To simulate the performance of a neutron detector array for empirical configuration optimization and preliminary algorithm evaluation.
Methods and Materials: Utilizing a compact array of borated Polyvinyl Toluene light pipes and Photomultiplier Tubes, pulse shape analysis, standard spectral histogramming, and multiplicity counting can enable neutron measurements for multiple applications.
Results: Results demonstrate that analysis with Monte Carlo N-Particle (MCNP) can be used to obtain a better understanding of field measurement results and aid in algorithm development for unfolding in conjunction with detector optimization.
Conclusions: Use of a handheld neutron spectrometer has promise of widespread applicability. By correlating MCNP results with empirical measurements, substantial confidence can be placed on predicting detector response to sufficiently similar spectral sources under alternate experimental configurations. In addition, use of the detector has substantial promise for operational health physics applications.

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